

Alen Zimic Sheen

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EDUCATION

2019 - 2024

Bachelor of Science (B.Sc.) in Environmental Engineering, Universidad Peruana Cayetano Heredia (UPCH), Lima, Peru

GPA: 3.86; 2nd place in order of merit among the complete program of Environmental Engineering (16.9/20.00 in original scale)

RESEARCH EXPERIENCE

Aug 2025 - Current

Laboratory Technician. Plant Science Department, Cornell University

PI: Gaurav Moghe, PhD. Cornell, Ithaca, NY

- LLM-driven mining of uncharacterized plant metabolites
 - Developing Python LLM-based data-mining pipelines for extracting and linking metabolites, genes, tissues, species and molecular traits to develop Graph Neural Networks for prediction of new bioactive molecules and genes relevant to stress-resilience.

Jan 2025 - May 2025

Visiting Student Researcher. Plant Gene Expression Center, University of California Berkeley - USDA

PI: Devin Coleman-Derr, PhD. UC Berkeley, Albany, CA

- Longitudinal RNA-Seq of Synthetic microbial communities
 - Prepare plant microboxes experiments for the time-dependent evaluation of plant responses to synthetic communities inoculations under drought stress.
 - Performed RNA extraction from soil, plant roots, shoots and leaves, phenotypic evaluation of roots, shoots and leaves (length, mass and branching).
- Streptomyces' role and its hidden diversity in Sorghum root under drought - **Published in PLOS Biology**
 - Functional genomic analysis of 12 Streptomyces strains whole genome sequences.
 - Genomic and phenotypic associations - computational analysis.

Jun 2021 - Jan 2025

Research Assistant, Bioinformatics and Molecular Biology Laboratory

PI: Mirko Zimic, PhD & Patricia Sheen, PhD. UPCH, Lima, Peru

- Alignment and In Silico Modeling of Antigens (published) **Collaboration with Dr. Robert Gilman, Cysticercosis Group in Peru**
 - Predicted and compared the distribution of linear (T) and conformational (B) epitopes in tested antigens using immunoinformatic tools.
 - Conducted global and local alignment of antigens using LALIGN, and predicted MHC-I and MHC-II linear T epitopes for Peruvian native population alleles.
- Prediction and Evaluation of Adhesin-type Proteins in the Genome and Transcriptome of *Taenia solium* (Current) **Collaboration with Dr. Robert Gilman, Cysticercosis Group in Peru**
 - Constructed adhesin protein databases and conducted blastX analysis between the *Taenia solium* genome and protein databases.
 - Analyzed best HSPs (High-Scoring Pairs) from BLAST results and reported potential ORFs (Open Reading Frames) based on HSP coordinates.

- Bioinformatics Analysis of Microbe Distribution in Lake Titicaca **Collaboration with Dr. Robert Gilman from Johns Hopkins University.**
 - Training in DNA preparation for metagenomic sequencing from water samples.
 - Processed data with bioinformatic pipelines for taxonomic classification.
- Development of a molecular platform based on truncated INP to display heterologous proteins on the surface of *Salmonella enterica* *Enteritidis*.
 - Fusion protein topology prediction and modeling (*ab initio* and homology model prediction).
 - Evaluation of protein quality parameters and structural alignments.

Jan 2024 - Jan 2025

Bachelor's Thesis, Laboratory of Functional Genomics

PI: Luis De-Stefano, PhD. UPCH, Lima, Peru

- Thesis: "Effect of biol (bovine biofertilizer) on taxonomic and functional changes in the rhizosphere microbiome of avocado trees in an agro-export farm in Chincha, Ica, Peru" (current)
 - Designed and implemented a pilot field study, applying treatments to study subjects.
 - DNA extraction, purification, library preparation, and sequencing using Oxford Nanopore Technologies' PromethION.
 - Processed data with bioinformatic pipelines for taxonomic classification, assembly, functional assignment, and performed statistical analyses in R.

Sep 2023 - Jan 2025

Research Assistant, Laboratory of Andean-Amazonian Chemistry of Life

PI: Denis Castillo, PhD. UPCH, Lima, Peru

- Development of alginate-xanthan gum hydrogels for controlled urea release in sustainable agriculture (current)
 - Planned and conducted water retention, biodegradability, and phytotoxicity tests on hydrogels with varying urea concentrations.
 - Statistical analysis on hydrogel physical and chemical structures was performed using R and Python bioinformatics packages.

Dec 2022 - Mar 2023

Trainee, Laboratory of Molecular Microbiology

PI: Monica Pajuelo, PhD. UPCH, Lima, Peru

- Training in antibiogram evaluation of wastewater samples.
- Assistance in the development of an experimental design for the metagenomic evaluation of Peruvian wastewater samples, focusing on its resistome.

PUBLICATIONS

Published

Fonseca-Garcia, C., Pettinga, D., **A Zimic-Sheen**, et al. Streptomyces' role and its hidden diversity in Sorghum root under drought. (2025) *PLOS Biology*

Piero Latorre, **A Zimic-Sheen**, et al. Microfluidic chip printing protocol for chip characterization. (2025) *Progress in Additive Manufacturing*.

Leonardo J. Monroy-Cruz, **A Zimic-Sheen**, et al. Electrochemical Determination of Pb(II) and Cu(II) on a FTO electrode modified with Ag nanoparticles stabilized with nafion. (2025) *PLOS ONE*.

Piero G. Latorre-Quevedo, **A Zimic-Sheen**, et al. An Open Hardware Bioprinter: A bioextruder with a peristaltic pump approach. (2023) *Institute of Electrical and Electronics Engineers Journal*.

L Toribio, C Guzman, S Noazin, **A Zimic-Sheen**, et al. Multiantigen print immunoassay (MAPIA) for

the diagnosis of neurocysticercosis: a single-center diagnostic optimization and accuracy study in Lima, Peru. (2022) *Journal of Clinical Microbiology*.

To be submitted in 2026

A Zimic-Sheen, et al. Evaluation of the impact of the application of inorganic fertilizers in conjunction with biostimulants on the taxonomic and functional changes of the rhizosphere microbiome of avocado in an agro-exporting farm.

A Zimic-Sheen, et al. Development of alginate hydrogels with xanthan gum for controlled release of urea in sustainable agriculture.

Mishell Landa, Belen Balta, **A Zimic-Sheen**, et al. Prediction and evaluation of adhesin-like proteins in the genome and transcriptome of *Taenia Solium*.

FUNDING

Aug 2025

[Concytec - ProCIENCIA Applied Multidisciplinary Research Project Grant](#) Designed and wrote the proposal "Identification, validation, and formulation of native microbial species with bioinoculant potential to increase water stress tolerance in avocado (*Persea americana* var. Hass) in the Lambayeque region". – **Awarded with 500 000 soles (\$139 275) for 3 years**

Oct 2024

Funded with \$10 000 by Agricola Cerro Prieto as exclusive sponsor and **\$8 000** by IGEM for pitching in the Grand Jamboree in Paris, France

Apr 2024

Support in the Preparation of an R01 NIH Grant Led by Dr. Robert Gilman (Johns Hopkins University) to Evaluate the Microbiome Composition of Soil Affected by Environmental Stressors such as Floods and Droughts **Collaboration with Dr. Robert Gilman, Johns Hopkins University.** – **Not awarded**

Feb 2024

[Concytec - ProCIENCIA Applied Multidisciplinary Research Project Grant](#) Designed and wrote the proposal "Development of Smart Hydrogels with Controlled Release of Fertilizers and Nutrients for Organic Agriculture with Low Environmental Impact". – **Not awarded**

Feb 2024

Funded with \$2500 by Maquinaria Agricola San Jose for designing and developing a metagenomic analysis for the evaluation of liquid biofertilizer applications on their soils

MEDIA APPEARANCES

Oct 2024

[Speaker at TEDxLima](#) on the genetic richness of Peruvian soil and its impact on society.

Jul 2024

Featured in [Agencia Andina](#), [La República](#), [Radio Nacional](#) [Radio broadcast interview], and iGEM official Newsletter for leading Paqta, the sole Peruvian team advancing in iGEM Grand Jamboree Paris 2024, focused on mitigating soil degradation through synthetic biology.

HONORS AND AWARDS

Apr 2025

NSF-GRFP Honorable Mention – Elucidating how plant community diversity shapes microbial mediation of energy allocation in plant immune responses

Aug 2024 - Mar 2025

[Científico Latino Fellow](#). One of the one hundred people (over +500) selected to get personalized guidance in graduate admission and scholarship funding for applications.

Mar 2024 - Oct 2025

[iGEM 2024 Venture Creation Labs](#) - Final Stage. Best Presentation Award – iGEM Grand Jamboree invitation as one of the best five teams worldwide in the Food and Agriculture track. Focus on developing a business model for improving *Persea americana* development using synthetic biology to increase phytohormone production in rhizobacteria.

Aug 2024

[Awarded a fully funded research expedition to Huaraz, Peru](#), to investigate plant and microbiome capabilities for bioremediating acid mine drainage and to develop cutting-edge biotechnological research proposals.

Jun - Dic 2023

[IX Concurso de Proyectos de Promoción de la Responsabilidad Social Universitaria](#) - First Place. Helped in the experimental design of the project “Turning organic waste into compost and farm animal feed at an early childhood education institution in San Martin de Porres.”

Nov 2022 - Mar 2023

[HUC Social Ideas Challenge](#) - Second Place Winner. Designed a sustainable and low-cost hydrophobic bio-coating material for the agricultural industry to reduce the exposure of farmers to agrochemicals.

Jan - Dic 2022

[International Genetically Engineered Machine \(iGEM\) Design League](#) - Team Leader – 2nd place. Funding awarded by the Philosophy and Science Faculty of the university. Silver medal for the development of a biofungicide for Hass Avocado trees utilizing synthetic biology techniques.

POSTERS AND PRESENTATIONS

Apr 2025

24TH Annual Microbiology Student Symposium - UC Berkeley. Poster presentation (in person). Streptomyces’ role and its hidden diversity in Sorghum root under drought - Genomic analysis.

Oct 2024

[iGEM Grand Jamboree - Paris, France](#). Poster presentation. Sole Latin American and one of five globally selected teams invited: Genetically Modifying Plant Growth Promoting Bacteria for agriculture.

Jun 2024

[Tech Startup Week](#) - University of Lima. Oral presentation on behalf of Universidad Peruana Cayetano Heredia. Development of bacteria consortia for improving agricultural efficiency as a metagenomic data-driven business model.

Nov 2023

[Science Poster Contest in UPCH Science Week](#). Oral presentation (in person). Evaluation of rhamnolipid overproduction in *Pseudomonas putida* for hydrocarbon bioremediation.

Oct 2023

[XXIV Jornadas Científicas “Dr. Abraham Vaisberg Wolach”](#) of the Universidad Peruana Cayetano Heredia (UPCH). 2nd Place Winners. Oral presentation (in person). Development of electrochemical sensors for the detection of heavy metals in aqueous solutions.

Sep 2023

30th Peruvian Congress of Chemistry SILAE (Italian-Latin American Society of Ethnomedicine). Oral presentation (in person). Development of electrochemical sensors for the detection of heavy metals in aqueous solutions.

PROFESSIONAL EXPERIENCE

Sept 2024 - Feb 2025

External consultant - Agrícola Cerro Prieto S.A.C. - Alfonso Bustamante (Commercial Manager) In charge of leading a 140k (dollars) grant proposal (Applied Research Projects 2025-02, ProCiencia, CONCYTEC, Peru) with a project titled “Identification, validation and formulation of native microbial species with bioinoculant potential to increase tolerance to water stress in avocado (*Persea americana* Hass variety) in the Lambayeque-Peru region”.

Jan - Mar 2024

Agricultural Exporting Farm Maquinaria Agrícola San José in Chincha, Ica, Peru. – **Ing. Ignacio Cilloniz** Responsible for the design and experimental implementation of soil microbiota analysis in the avocado crop field. Evaluated different fertigation regimes on the taxonomy and genetic functionality of the rhizosphere of 72 Hass avocado trees using shotgun metagenomics.

Jan - Apr 2022

Agricultural Exporting Farm Copacabana de Chincha SA, Peru. – **Ing. Sergio Cartagena** Participated in the installation of anaerobic biodigesters for wastewater treatment. Reviewed the company's procedures to comply with Peruvian environmental regulations and obtain international certification to export agricultural products (mandarin, avocado, grapes, and blueberries).

Jan - Apr 2022

Farvet Laboratories - Laboratory Assistant Intern. – **Manolo Fernandez (CEO Farvet)** Supported the research team in the detection of antibodies through artificial intelligence (a method to detect SARS-CoV-2). Experience in the development of molecular agglutination tests as immunology assays.

GITHUB REPOSITORIES

Jun 2024

PupilTrackingDiagnosis. Computer vision-based program to track and analyze saccadic eye movements in response to a moving stimulus on a screen for early Parkinson's disease detection.

Apr - Jun 2024

AutismSketchClassifier. Pre-trained a ResNet neural network and used its feature vectors for KNN classification to detect autism-specific features in children's sketches.

TEACHING EXPERIENCE

Nov 2025 - Present

Plant Biochemistry master's graduate student mentor in Cornell

Aug - Dec 2023

Leader of the Journal Club of Genetic Engineering in Bioremediation, UPCH. Conceptualized, designed, and led discussions on new organic and heavy metal bioremediation methods.

Feb - Jul 2023

Leader of the Journal Club of Applied Mycology, UPCH. Led discussion sessions on the latest applications of fungi in industry.

LEADERSHIP AND OUTREACH

Nov 2025 - Present

Student co-lead for the Cornell Initiative for Computational Innovation in Plant Sciences (I-CIPS)

Oct 2024 - Present

Member of the Engineering Plan Committee of the International Genetically Engineered Machine (IGEM) Foundation. Supporting plant-based synthetic biology projects of teams worldwide

Jan - Dec 2022

[Member of the Board of Directors of the Journal Club, UPCH](#), in charge of the logistics and communication area.

Jan - Dec 2021

Writer and later Head of the Environmental Engineering area in the student magazine of the Universidad Peruana Cayetano Heredia "*The Novice Scientist*."

[Article 1](#), [Article 2](#), [Article 3](#), [Article 4](#)

COURSES

Aug - Dec 2025

Course: Plant Biochemistry, graduate level - Cornell

Mar - Jul 2024

Course: Computer Vision, Elective course for bachelor's degree in Informatic Engineering.

May 2024

Online Workshop: Plant Cell Atlas Spatial Omics, Michigan State University, Plant Resilience Institute.

Sep - Oct 2023

Course: Bioinformatics I, Master's level course, Universidad Peruana Cayetano Heredia.

Mar - Aug 2023

Course: Bacterial Genetics, Elective course for bachelor's degree in biology.

LABORATORY TECHNIQUES

Bioinformatics: Genome assembly and annotation, protein structure and homology modeling, functional prediction of hypothetical proteins, differential gene expression, NGS analysis, and scripting (Python, Bash, R).

Molecular Biology: RNA and DNA extraction (plant tissues, environmental), cloning and transformation, *E. coli* expression, PCR, electrophoresis, metagenomic library preparation, DNA purification, and Oxford Nanopore sequencing.

LANGUAGES

Spanish: Native speaker.

English: Advanced level (C1).

OTHER INTERESTS

Jun 2024

First place, UPCH all-around foosball tournament (university-wide).

2015 – Jan 2025

Theater and drama studies; member of university improv cast with performances at UPCH Theater, Club de Teatro de Lima, San Martín de Porres, and UNI.

2018 – 2023

Leader in youth confirmation catechesis, mentoring 50+ adolescents; organized community service projects in nursing homes, orphanages, and low-income areas.

Jan – Aug 2018

First place, ADECOPA national basketball tournament with San Agustín School.